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L1: Entry 1 of 1   File: DWPI   Mar 28, 1995

DERWENT-ACC-NO: 1995-158602
DERWENT-WEEK: 199521

TITLE: Pneumatic tyre where ground-contact area decreases progressively towards edges - has enhanced suppression of water invasion into tread surface hence wet performance properties can be improved

PATENT-ASSIGNEE:

ASSIGNEE	CODE
YOKOHAMA RUBBER CO LTD	YOKO

PRIORITY-DATA: 1993JP-0227573 (September 13, 1993)

Search Selected   Search ALL   Clear

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
JP 07081303 A	March 28, 1995		005	B60C003/04

APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
JP 07081303A	September 13, 1993	1993JP-0227573	

INT-CL (IPC): B60 C 3/04; B60 C 9/08; B60 C 11/00

ABSTRACTED-PUB-NO: JP 07081303A
BASIC-ABSTRACT:

In a pneumatic tyre with the shape of the ground-contact area whose circumferential length is maximum at the centre of the ground-contact width and becomes progressively smaller toward both edges, the ratio of the ground-contact length, m, at the position apart from the centre of the ground-contact width by 90% of half of the maximum ground-contact width to the maximum ground-contact length, M, ranges from 0.65 to 0.80. the percentage of the overall groove area in the overall ground-contact area is 20 to 50%.

The percentage of the groove area in the ground-contact centre area which is equivalent to 40% of the maximum ground-contact area, is set smaller than that of the overall groove area.

ADVANTAGE - Suppression of water invasion into the tread surface is enhanced, and thus wet performance can be improved.

CHOSEN-DRAWING: Dwg.1/3

TITLE-TERMS: PNEUMATIC TYRE GROUND CONTACT AREA DECREASE PROGRESS EDGE ENHANCE SUPPRESS WATER INVADE TREAD SURFACE WET PERFORMANCE PROPERTIES CAN IMPROVE

DERWENT-CLASS: A95 Q11

CPI-CODES: A12-T01B;

ENHANCED-POLYMER-INDEXING:
Polymer Index [1.1] 017 ; H0124*R Polymer Index [1.2] 017 ; ND01 ; K9416 ; K9905 ; Q9999 Q9256*R Q9212 ; B9999 B5367 B5276

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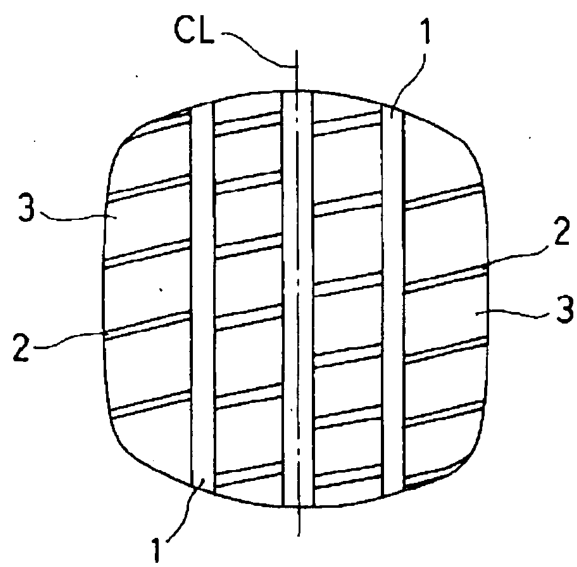
(54)【発明の名称】　空気入りタイヤ

(57)【要約】

【目的】　転がり抵抗の悪化を抑制しながら、ウェット性能を向上するようにした空気入りタイヤを提供する。

【構成】　トレッド面の接地形状を、接地幅中心を通るタイヤ周方向の接地長を最大とし、前記接地幅中心CLから左右両側に向かうほど徐々に短かくなる形状にした空気入りタイヤにおいて、前記タイヤ周方向の最大接地長Mと前記接地幅中心CLから左右両側へそれぞれ接地最大半幅の９０％の位置Dにおけるタイヤ周方向の接地長mとの両接地長の比m／Mを０．６５～０．８０とし、全接地領域の全接地部溝面積率を２０～５０％とし、かつ接地最大幅Wの４０％の幅に相当する接地中央部領域の中央部溝面積率を前記全接地部溝面積率よりも小さくする。



【特許請求の範囲】

【請求項１】　トレッド面の接地形状を、接地幅中心を通るタイヤ周方向の接地長を最大とし、前記接地幅中心から左右両側に向かうほど徐々に短かくなる形状にした空気入りタイヤにおいて、
前記タイヤ周方向の最大接地長Ｍと前記接地幅中心から左右両側へそれぞれ接地最大半幅の９０％の位置におけるタイヤ周方向の接地長ｍとの両接地長の比ｍ／Ｍを０．６５〜０．８０にすると共に、全接地領域の全接地部溝面積率を２０〜５０％とし、かつ接地最大幅Ｗの４０％の幅に相当する接地中央部領域の中央部溝面積率を前記全接地部溝面積率よりも小さくした空気入りタイヤ。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は低転がり抵抗の悪化を抑制しながらウェット性能を向上する空気入りタイヤに関する。

【０００２】

【従来の技術】従来、空気入りタイヤのウェット性能を向上する手段として、トレッド面の接地形状を接地幅の中心を通るタイヤ周方向の最大接地長をＭ、この接地幅中心から左右両側へそれぞれ接地最大半幅の９０％の位置におけるタイヤ周方向の接地長をｍとするとき、両接地長の比ｍ／Ｍを従来の０．８〜０．９よりも小さい０．６５より小とすることによってウェット性能を向上させる提案がなされている（特開平２−２６７００３号公報）。しかし、上記ｍ／Ｍを０．６５よりも小さくするとウェット性能は向上するものの、転がり抵抗が急激に悪化するという問題があった。

【０００３】

【発明が解決しようとする課題】本発明の目的は転がり抵抗の悪化を抑制しながら、ウェット性能を向上するようにした空気入りタイヤを提供することにある。

【０００４】

【課題を解決するための手段】このような目的を達成する本発明は、トレッド面の接地形状を、接地幅中心を通るタイヤ周方向の接地長を最大とし、前記接地幅中心から左右両側に向かうほど徐々に短かくなる形状にした空気入りタイヤにおいて、前記タイヤ周方向の最大接地長Ｍと前記接地幅中心から左右両側へそれぞれ接地最大半幅の９０％の位置におけるタイヤ周方向の接地長ｍとの両接地長の比ｍ／Ｍを０．６５〜０．８０にすると共に、全接地領域の全接地部溝面積率を２０〜５０％とし、かつ接地最大幅Ｗの４０％の幅に相当する接地中央部領域の中央部溝面積率を前記全接地部溝面積率よりも小さくしたことを特徴とするものである。

【０００５】このように接地幅中心のタイヤ周方向の接地最大長Ｍと、接地幅中心から左右両側へそれぞれ接地最大半幅の９０％の位置におけるタイヤ周方向の接地長ｍとの比ｍ／Ｍを０．６５〜０．８０の範囲にしたため転がり抵抗の増大を招かず、しかも、全接地領域の全接地部溝面積率を２０〜５０％にし、かつ中央部溝面積率を全接地部溝面積率よりも小さくすることによりトレッド面中央域に水を入り難くしてウェット性能を向上することができる。

【０００６】本発明において、タイヤの接地形状とはタイヤにＪＡＴＭＡに規定する設計常用荷重に対応する空気圧を充填し、設計常用荷重の８５％の荷重を負荷したときに、トレッド面が平坦な路面に形成する形状のことをいう。以下、図面を参照して本発明を具体的に説明する。図１は本発明タイヤのトレッドパターンの一例を示し、タイヤ周方向に延びる３本の主溝１とこれら主溝１相互間及び主溝１と左右両側の接地端との間を繋ぐ副溝２が設けられ、これら主溝１と副溝２とで区分されたブロック３がタイヤ周方向に４列のブロック列をなすブロックパターンを形成している。

【０００７】本発明タイヤのトレッド面の接地形状は、図２に示すように、矢印Ｙで示す進行方向前側の輪郭Ｆと後側の輪郭Ｒとがそれぞれ中央のＡ，Ａ’を頂点として前後外側に「へ」の字状に屈曲した形状になっている。具体的には、接地形状の接地最大幅Ｗ（Ｃ−Ｏ−Ｃ’の幅）の中心Ｏにおけるタイヤ周方向の接地長（Ａ−Ｏ−Ａ’の長さ）が最大のＭとなり、この部分を接地幅中心ＣＬとして左右両側の部分のタイヤ周方向の接地長が徐々に短かくなっている。

【０００８】本発明のタイヤでは、上記最大接地長Ｍに対し接地幅中心ＣＬから左右両側にそれぞれ接地最大半幅（Ｗ／２）の９０％離れた位置Ｄにおけるタイヤ周方向の接地長ｍ（Ｂ−Ｄ−Ｂ’の長さ）の比ｍ／Ｍを０．６５〜０．８０の範囲にする。このようにｍ／Ｍを小さくすることにより、接地形状の進行方向前側の輪郭Ｆが路面上の水を左右両側へ排除してトレッド面内に入り込むのを抑制するため、ウェット性能を向上する。しかし、ｍ／Ｍ＝０．６５〜０．８０にしただけでは、０．８〜０．９の従来タイヤに比べてウェット性能の向上効果が十分ではないため、トレッド面の全接地部溝面積率を２０〜５０％にすると共に、接地最大幅Ｗの４０％に相当する中央部領域Ｅにおける中央部溝面積率を全接地部溝面積率よりも小さくすることにより一層の向上を可能にする。　このウェット性能の向上のためには、さらに中央部溝面積率を、上記全接地部溝面積率との関係を維持した上で、さらに３０％以下にするのがよい。

【０００９】このような本発明タイヤは上記接地幅中央部領域と両ショルダー部領域との溝面積率の差によってショルダー側に偏摩耗が生じ易くなる恐れがある。この対策としては、キャップトレッドゴムとして転がり抵抗の低減に有利な損失正接tanδ（６０℃）が低く、かつウェット性能の向上に有利なtan　δ（０℃）が高いゴムで、しかも、カーボンブラックと、ケイ酸やケイ酸塩等

のホワイトカーボンを併用して配合し、硬度を高くしたゴム組成物を使用することが望ましい。

【0010】この場合、カーボンブラックとしては、窒素吸着量（N_2 SA）が40～90m^2／g，ジブチルフタレート（DBP）吸油量が80～150cm^3／100ｇであるものを使用するのがよい。また、このゴム組成物のゴム成分は、上記ホワイトカーボンに対する混和性に優れた天然ゴムを必須成分として使用することが望ましい。

【0011】

【実施例】

実施例1

タイヤサイズを185／65Ｒ14、トレッドパターンを図1、全接地部溝面積率を30％とする点を共通にし、ｍ／Ｍを0．5，0．6，0．7，0．8及び0．9に異ならせた5種類のタイヤを作成した。これら5種類のタイヤの転がり抵抗とウェット性能を、下記の測定方法で測定し、その測定結果をそれぞれプロットしたところ図3のグラフが得られた。

【0012】転がり抵抗：試験タイヤにＪＡＴＭＡに規定する設計常用荷重に対応する空気圧を充填し、直径1700mmのドラムに対し設計常用荷重の85％に相当する荷重を負荷し押しつけた状態で、速度80ｋｍ／ｈで走行させたときの転がり抵抗を測定した。測定結果は逆数をもって評価し、ｍ／Ｍ＝0．9、全接地部溝面積率が30％のタイヤ（従来タイヤ）の測定値の逆数を基準（100）とする指数で表示した。この指数が大きいほど転がり抵抗が小さいことを意味する。

【0013】ウェット性能：試験タイヤに190ｋＰａの空気圧を充填し、350ｋｇの荷重を負荷してウェットスキッド路面に押し付けながら80ｋｍ／ｈの速度で走行し、タイヤをロックした時の摩擦係数を測定する。

測定結果は、ｍ／Ｍ＝0．9、全接地部溝面積率が30％の従来タイヤの測定値を基準（100）とする指数で表示した。この指数が大きいほどウェット性能が優れていることを意味する。

【0014】図3からウェット性能はｍ／Ｍが小さくなるにつれて直線的に向上している。これに対し、転がり抵抗はｍ／Ｍが0．70までは変わらないが0．65より小さくなると急激に低下することが判る。すなわち、ｍ／Ｍを小さくすると、図2に示した接地形状の進行方向前側の輪郭Ｆによるタイヤ進行方向Ｙ前側の路面上の水の排除効果と、トレッド面内に入り込む水量の抑制効果が作用し、ウェット性能を向上する。しかし、このｍ／Ｍを0．65よりも小さくすると転がり抵抗が急激に悪化することが判る。

【0015】実施例2

トレッドパターンを図1、タイヤサイズを185／65Ｒ14、全接地部溝面積率を30％とする点を共通にし、ｍ／Ｍ、中央部溝面積率及びキャップトレッドゴムの種類を表1のａ，ｂのいずれかに変更した3種類の従来タイヤ、本発明タイヤ1，2をそれぞれ製作した。

【0016】これらの3種類のタイヤについて、実施例1と同じ転がり抵抗とウェット性能を評価すると共に、下記方法によりショルダー摩耗を評価し、その結果を表1に示した。

ショルダー摩耗：試験タイヤを車両に装着し、10，000ｋｍ走行した後のセンター部主溝とショルダー部主溝の溝深さをそれぞれ測定し、センター部主溝深さに対するショルダー部主溝の溝深さの比を測定した。測定結果は逆数をもって評価し、従来タイヤの値の逆数を基準（100）とする指数で示した。この値が大きいほど耐偏摩耗性が優れている。

【0017】

表1

	従来タイヤ	本発明タイヤ1	本発明タイヤ2
m／M	0.85	0.72	0.72
中央部溝面積率（％）	30	15	15
キャップトレッドゴムの種類	a	a	b
転がり抵抗（指数）	１００	１００	１１２
ウェット性能（指数）	１００	１０４	１０４
ショルダー摩耗（指数）	１００	９９	１０５

【００１８】

表2

	a	b
ＮＲ	５０	５０
ＳＢＲ	５０	５０
亜鉛華	３	３
ステアリン酸	２	２
老化防止剤	２	２
オイル	８	８
加硫促進剤	０．７	０．７
硫黄	１．７	１．７
カーボンブラック	５０	２５
シリカ	――	２５
シランカップリング剤	――	３
ＪＩＳ 硬度	６０	６５
tan δ（60℃）	０.１１７	０.０８９
tan δ（０℃）	０.２６３	０.３００

表２中、シランカップリング剤はビス－（３－トリエトキシシリルプロピル）テトラスルフィド（Bis-(3-triethoxysilylpropyl)-tetra-sulfide）である。

【００１９】表１から、本発明タイヤ１は従来タイヤに比べて転がり抵抗とショルダー摩耗は変わらないが、ウェット性能が著しく向上している。また、本発明タイヤ２はキャップトレッドゴムとしてtan δ（60℃）が低くtan δ（０℃）の高い、高硬度のゴム使用したため、従来タイヤに比べてウェット性能、転がり抵抗及び耐偏摩耗性のいずれも大幅に向上していることが判る。

【００２０】

【発明の効果】本発明タイヤは、そのトレッド面の接地形状を、接地幅中心のタイヤ周方向の最大接地長Ｍと、接地幅中心から接地最大半幅の９０％離れた位置でのタイヤ周方向接地長ｍとの比ｍ／Ｍを０．６５～０．８０の範囲にしたため転がり抵抗の増大を抑制し、しかも、全接地部溝面積率を２０～５０％とし、かつ中央部溝面積率を全接地部溝面積率よりも小さくしたため、トレッ

ド面内への水の浸入抑制効果を高めてウェット性能を向上することができる。

【図面の簡単な説明】

【図１】本発明タイヤのトレッドパターンの１例を示す平面図である。

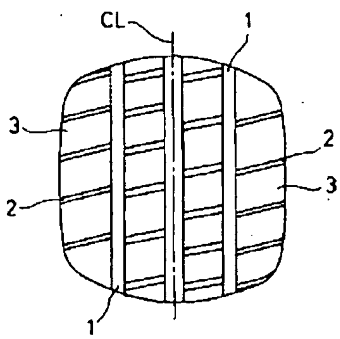
【図２】本発明タイヤの接地形状のタイヤ周方向接地長Ｍ，ｍの定義を説明する平面図である。

【図３】ｍ／Ｍとウェット性能及び転がり抵抗との関係を示すグラフである。

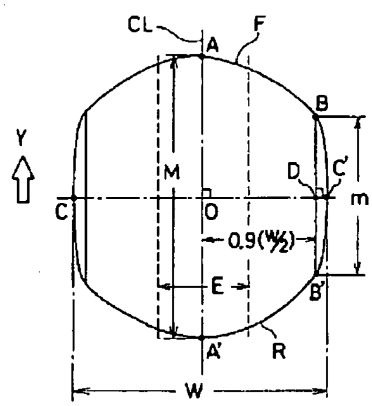
【符号の説明】

１　主溝　２　副溝
３　ブロック　Ｗ　接地最大幅
ＣＬ　接地幅中心　Ｍ　タイヤ周方向の最大接地長
ｍ　接地最大半幅の９０％離れた位置Ｄにおけるタイヤ周方向の接地長

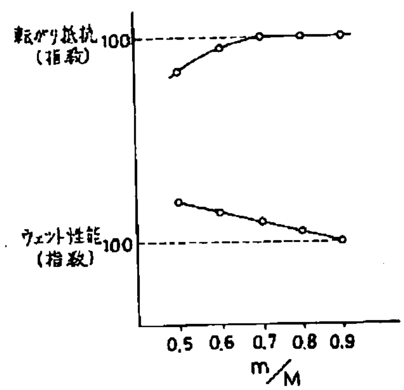
【図１】



【図２】



【図３】



* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the pneumatic tire which improves the wet engine performance, controlling aggravation of low rolling resistance.
[0002]
[Description of the Prior Art] Conventionally the maximum touch-down length of the tire hoop direction which passes the touch-down configuration of a tread side along the core of touch-down width of face as a means to improve the wet engine performance of a pneumatic tire M, When setting the touch-down length of the tire hoop direction in 90% of location of the touch-down maximum half width to m from this touch-down width-of-face core to right-and-left both sides, respectively, the ratio of both touch-down length -- the proposal which raises the wet engine performance is made by making m/M into smallness from 0.65 [smaller than conventional 0.8-conventional 0.9] (JP,2-267003,A). However, although the wet engine performance improved when above-mentioned m/M was made smaller than 0.65, there was a problem that rolling resistance got worse rapidly.
[0003]
[Problem(s) to be Solved by the Invention] The object of this invention is to offer the pneumatic tire the wet engine performance was made to improve, controlling aggravation of rolling resistance.
[0004]
[Means for Solving the Problem] In the pneumatic tire which this invention which attains such an object made max the touch-down length of the tire hoop direction which passes the touch-down configuration of a tread side along a touch-down width-of-face core, and was made into the configuration which becomes brief gradually, so that it goes to right-and-left both sides from said touch-down width-of-face core the ratio of the maximum touch-down length M of said tire hoop direction, and both touch-down length with the touch-down length m of a tire hoop direction [in / respectively / to the right-and-left both sides from said touch-down width-of-face core / 90% of location of the touch-down maximum half width], while setting m/M to 0.65-0.80 It is characterized by making smaller than said all touch-down section groove surface moments the center-section groove surface moment of the touch-down center-section field which makes all the touch-down section groove surface moments of all touch-down fields 20 - 50%, and is equivalent to 40% of width of face of the touch-down maximum width W.
[0005] m/M is written in the range of 0.65-0.80, and buildup of rolling resistance is not caused. thus, the ratio of the touch-down maximum length M of the tire hoop direction based on touch-down width of face, and the touch-down length m of a tire hoop direction [in / respectively / to the right-and-left both sides from a touch-down width-of-face core / 90% of location of the touch-down maximum half width] -- moreover By making all the touch-down section groove surface moments of all touch-down fields 20 - 50%, and making the center-section groove surface moment smaller than all the touch-down section groove surface moments, it can be made hard to go water into a tread side central region, and the wet engine performance can be improved.
[0006] In this invention, the touch-down configuration of a tire means the configuration which a tread

side forms in a flat road surface, when it is filled up with the pneumatic pressure corresponding to the design normal load specified into a tire at JATMA and the load of 85% of the load of a design normal load is carried out. Hereafter, with reference to a drawing, this invention is explained concretely. Drawing 1 shows an example of the tread pattern of this invention tire, the minor groove 2 which connects three major grooves 1 prolonged in a tire hoop direction, between these major groove 1, and between a major groove 1 and the touch-down edges of right-and-left both sides is formed, and the block 3 classified by these major grooves 1 and the minor groove 2 forms in a tire hoop direction the block pattern which makes the block train of four trains.
[0007] the profile F by the side of before [which is shown by the arrow head Y as the touch-down configuration of the tread side of this invention tire is shown in drawing 2] a travelling direction, and the profile R on the backside -- respectively -- central A and A' -- top-most vertices -- carrying out -- an order outside -- "-- passing -- " -- it is the configuration crooked in the shape of a character. The touch-down length (the die length of A-O-A') of the tire hoop direction in the core O of the touch-down maximum width W of a touch-down configuration (width of face of C-O-C') is set to the greatest M, and, specifically, the touch-down length of the tire hoop direction of the part of right-and-left both sides is brief gradually by setting this part as the touch-down width-of-face core CL.
[0008] the ratio of the touch-down length m (the die length of B-D-B') of the tire hoop direction in the location D which the touch-down maximum half width (W/2) separated from the touch-down width-of-face core CL 90% on right-and-left both sides to the above-mentioned maximum touch-down length M with the tire of this invention, respectively -- m/M is made into the range of 0.65-0.80. Thus, in order that the profile F by the side of before [of a touch-down configuration] a travelling direction may control eliminating the water on a road surface to right-and-left both sides, and entering in a tread side by making m/M small, the wet engine performance is improved. However, only by making it m/M=0.65-0.80, since the improvement effectiveness of the wet engine performance is not enough compared with the conventional tire of 0.8-0.9, while making all the touch-down section groove surface moments of a tread side 20 - 50%, much more improvement is enabled by making the center-section groove surface moment in the center-section field E equivalent to 40% of the touch-down maximum width W smaller than all the touch-down section groove surface moments. For improvement in this wet engine performance, it is good to make the center-section groove surface moment further, 30 more% or less, after maintaining relation with all the above-mentioned touch-down section groove surface moments.
[0009] Such this invention tire has a possibility of becoming easy to produce partial wear in a shoulder side according to the difference of the groove surface moment of the above-mentioned touch-down width-of-face center-section field and both the shoulder section field. It is desirable to use the rubber constituent with which loss tangent tandelta (60 degrees C) advantageous to reduction of rolling resistance as cap tread rubber is rubber with high tan delta (0 degree C) advantageous to improvement in the wet engine performance, moreover used together and blended carbon black and white carbon, such as a silicic acid and a silicate, and made the degree of hardness high low as this cure.
[0010] In this case, it is good to use the thing whose nitrogen amounts of adsorption (N2 SA) are 40-90m2 / g and whose dibutyl phthalate (DBP) oil absorption is 3 / 100g 80-150cm as carbon black. Moreover, as for the rubber component of this rubber constituent, it is desirable to use natural rubber excellent in the miscibility over the above-mentioned white carbon as an indispensable component.
[0011]
[Example]
The point which makes [example 1 tire size] 30% drawing 1 and all the touch-down section groove surface moments for 185 / 65R14, and a tread pattern was carried out in common, and five kinds of tires which changed m/M in 0.5, 0.6, 0.7, and 0.8 and 0.9 were created. The rolling resistance and the wet engine performance of these five kinds of tires were measured by the following measuring method, and when the measurement result was plotted, respectively, the graph of drawing 3 was obtained.
[0012] Rolling resistance: It was filled up with the pneumatic pressure corresponding to the design normal load specified into a trial tire at JATMA, and where it carried out the load of the load which is

equivalent to 85% of a design normal load to a drum with a diameter of 1700mm and it is forced, the rolling resistance at the time of making it run by rate 80 km/h was measured. The measurement result was evaluated with the inverse number and expressed as the characteristic to which m/M=0.9 and all the touch-down section groove surface moments make criteria (100) the inverse number of the measured value of 30% of tire (conventional tire). It means that rolling resistance is so small that this characteristic is large.

[0013] Wet engine performance: Fill up a trial tire with the pneumatic pressure of 190kPa(s), run at the rate of 80 km/h, carrying out the load of the 350kg load, and pushing against a wet skidding road surface, and measure coefficient of friction when locking a tire. m/M=0.9 and all the touch-down section groove surface moments expressed the measurement result as the characteristic which makes criteria (100) measured value of 30% of the conventional tire. It means that the wet engine performance is excellent, so that this characteristic is large.

[0014] From drawing 3 , the wet engine performance is improving linearly as m/M becomes small. On the other hand, although 0.70 does not change m/M, when rolling resistance becomes smaller than 0.65, it turns out that it falls rapidly. That is, if m/M is made small, the abatement effectiveness of the water on the road surface by the side of before [according to / the profile F by the side of before / of the touch-down configuration shown in drawing 2 / a travelling direction] tire travelling direction Y and the depressor effect of the amount of water which enters in a tread side will act, and the wet engine performance will be improved. However, when this m/M is made smaller than 0.65, it turns out that rolling resistance gets worse rapidly.

[0015] The point which makes example 2 tread pattern drawing 1 , and makes 30% 185 / 65R14, and all the touch-down section groove surface moments for tire size was carried out in common, and three kinds of conventional tires and this invention tires 1 and 2 which changed the class of m/M, the center-section groove surface moment, and cap tread rubber into a of a table 1 or b were manufactured, respectively.

[0016] About three kinds of these tires, while evaluating the same rolling resistance and the same wet engine performance as an example 1, the following approach estimated shoulder wear and the result was shown in a table 1.

Shoulder wear: The channel depth of the pin center,large section major groove after equipping a car with a trial tire and running a tire 10,000km, and a shoulder section major groove was measured, respectively, and the ratio of the channel depth of the shoulder section major groove to the pin center,large section major groove depth was measured. The measurement result was evaluated with the inverse number and the characteristic which makes the inverse number of the value of a tire criteria (100) conventionally showed it. Partial-wear-proof is excellent, so that this value is large.

[0017]

表1

	従　来 タイヤ	本発明 タイヤ 1	本発明 タイヤ 2
m／M	0.85	0.72	0.72
中央部溝面積率（%）	30	15	15
キャップトレッドゴムの種類	a	a	b
転がり抵抗（指数）	１００	１００	１１２
ウェット性能（指数）	１００	１０４	１０４
ショルダー摩耗（指数）	１００	９９	１０５

[0018]

表2

	a	b
ＮＲ ＳＢＲ	５０ ５０	５０ ５０
亜鉛華 ステアリン酸 老化防止剤 オイル 加硫促進剤 硫黄 ｶｰﾎﾞﾝﾌﾞﾗｯｸ シリカ シランカップリング剤	３ ２ ２ ８ ０．７ １．７ ５０ —— ——	３ ２ ２ ８ ０．７ １．７ ２５ ２５ ３
ＪＩＳ　硬度 tan δ（60℃） tan δ（０℃）	６０ 0.１１７ 0.２６３	６５ 0.０８９ 0.３００

the inside of a table 2, and a silane coupling agent -- screw-(3-triethoxy silyl propyl) tetrasulfide (Bis-(3-triethoxysilylpropyl)-tetra-sulfide) it is .

[0019] Although this invention tire 1 does not change rolling resistance and shoulder wear from a table 1

compared with a tire conventionally, the wet engine performance is improving remarkably. Moreover, this invention tire 2 is tan delta (60 degrees C) as cap tread rubber. Since the low high degree of hardness with high tan delta (0 degree C) carried out the rubber activity, it turns out that the wet engine performance, rolling resistance, and partial-wear-proof all are improving substantially compared with a tire conventionally.

[0020]

[Effect of the Invention] this invention tire the touch-down configuration of the tread side The maximum touch-down length M of the tire hoop direction based on touch-down width of face Write m/M in the range of 0.65-0.80, and buildup of rolling resistance is controlled. a ratio with the tire hoop direction touch-down length m in the location which the touch-down maximum half width separated from the touch-down width-of-face core 90% -- And all the touch-down section groove surface moments can be made into 20 - 50%, and the center-section groove surface moment can be written smaller than all the touch-down section groove surface moments, the encroachment depressor effect of the water into a tread side can be heightened, and the wet engine performance can be improved.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the pneumatic tire which improves the wet engine performance, controlling aggravation of low rolling resistance.
[0002]
[Description of the Prior Art] Conventionally the maximum touch-down length of the tire hoop direction which passes the touch-down configuration of a tread side along the core of touch-down width of face as a means to improve the wet engine performance of a pneumatic tire M, When setting the touch-down length of the tire hoop direction in 90% of location of the touch-down maximum half width to m from this touch-down width-of-face core to right-and-left both sides, respectively, the ratio of both touch-down length -- the proposal which raises the wet engine performance is made by making m/M into smallness from 0.65 [smaller than conventional 0.8-conventional 0.9] (JP,2-267003,A). However, although the wet engine performance improved when above-mentioned m/M was made smaller than 0.65, there was a problem that rolling resistance got worse rapidly.
[0003]
[Problem(s) to be Solved by the Invention] The object of this invention is to offer the pneumatic tire the wet engine performance was made to improve, controlling aggravation of rolling resistance.
[0004]
[Means for Solving the Problem] In the pneumatic tire which this invention which attains such an object made max the touch-down length of the tire hoop direction which passes the touch-down configuration of a tread side along a touch-down width-of-face core, and was made into the configuration which becomes brief gradually, so that it goes to right-and-left both sides from said touch-down width-of-face core the ratio of the maximum touch-down length M of said tire hoop direction, and both touch-down length with the touch-down length m of a tire hoop direction [in / respectively / to the right-and-left both sides from said touch-down width-of-face core / 90% of location of the touch-down maximum half width], while setting m/M to 0.65-0.80 It is characterized by making smaller than said all touch-down section groove surface moments the center-section groove surface moment of the touch-down center-section field which makes all the touch-down section groove surface moments of all touch-down fields 20 - 50%, and is equivalent to 40% of width of face of the touch-down maximum width W.
[0005] m/M is written in the range of 0.65-0.80, and buildup of rolling resistance is not caused. thus, the ratio of the touch-down maximum length M of the tire hoop direction based on touch-down width of face, and the touch-down length m of a tire hoop direction [in / respectively / to the right-and-left both sides from a touch-down width-of-face core / 90% of location of the touch-down maximum half width] -- moreover By making all the touch-down section groove surface moments of all touch-down fields 20 - 50%, and making the center-section groove surface moment smaller than all the touch-down section groove surface moments, it can be made hard to go water into a tread side central region, and the wet engine performance can be improved.
[0006] In this invention, the touch-down configuration of a tire means the configuration which a tread

side forms in a flat road surface, when it is filled up with the pneumatic pressure corresponding to the design normal load specified into a tire at JATMA and the load of 85% of the load of a design normal load is carried out. Hereafter, with reference to a drawing, this invention is explained concretely. Drawing 1 shows an example of the tread pattern of this invention tire, the minor groove 2 which connects three major grooves 1 prolonged in a tire hoop direction, between these major groove 1, and between a major groove 1 and the touch-down edges of right-and-left both sides is formed, and the block 3 classified by these major grooves 1 and the minor groove 2 forms in a tire hoop direction the block pattern which makes the block train of four trains.

[0007] the profile F by the side of before [which is shown by the arrow head Y as the touch-down configuration of the tread side of this invention tire is shown in drawing 2] a travelling direction, and the profile R on the backside -- respectively -- central A and A' -- top-most vertices -- carrying out -- an order outside -- "-- passing -- " -- it is the configuration crooked in the shape of a character. The touch-down length (the die length of A-O-A') of the tire hoop direction in the core O of the touch-down maximum width W of a touch-down configuration (width of face of C-O-C') is set to the greatest M, and, specifically, the touch-down length of the tire hoop direction of the part of right-and-left both sides is brief gradually by setting this part as the touch-down width-of-face core CL.

[0008] the ratio of the touch-down length m (the die length of B-D-B') of the tire hoop direction in the location D which the touch-down maximum half width (W/2) separated from the touch-down width-of-face core CL 90% on right-and-left both sides to the above-mentioned maximum touch-down length M with the tire of this invention, respectively -- m/M is made into the range of 0.65-0.80. Thus, in order that the profile F by the side of before [of a touch-down configuration] a travelling direction may control eliminating the water on a road surface to right-and-left both sides, and entering in a tread side by making m/M small, the wet engine performance is improved. However, only by making it m/M=0.65-0.80, since the improvement effectiveness of the wet engine performance is not enough compared with the conventional tire of 0.8-0.9, while making all the touch-down section groove surface moments of a tread side 20 - 50%, much more improvement is enabled by making the center-section groove surface moment in the center-section field E equivalent to 40% of the touch-down maximum width W smaller than all the touch-down section groove surface moments. For improvement in this wet engine performance, it is good to make the center-section groove surface moment further, 30 more% or less, after maintaining relation with all the above-mentioned touch-down section groove surface moments.

[0009] Such this invention tire has a possibility of becoming easy to produce partial wear in a shoulder side according to the difference of the groove surface moment of the above-mentioned touch-down width-of-face center-section field and both the shoulder section field. It is desirable to use the rubber constituent with which loss tangent tandelta (60 degrees C) advantageous to reduction of rolling resistance as cap tread rubber is rubber with high tan delta (0 degree C) advantageous to improvement in the wet engine performance, moreover used together and blended carbon black and white carbon, such as a silicic acid and a silicate, and made the degree of hardness high low as this cure.

[0010] In this case, it is good to use the thing whose nitrogen amounts of adsorption (N2 SA) are 40-90m2 / g and whose dibutyl phthalate (DBP) oil absorption is 3 / 100g 80-150cm as carbon black. Moreover, as for the rubber component of this rubber constituent, it is desirable to use natural rubber excellent in the miscibility over the above-mentioned white carbon as an indispensable component.

[0011]

[Example]

The point which makes [example 1 tire size] 30% drawing 1 and all the touch-down section groove surface moments for 185 / 65R14, and a tread pattern was carried out in common, and five kinds of tires which changed m/M in 0.5, 0.6, 0.7, and 0.8 and 0.9 were created. The rolling resistance and the wet engine performance of these five kinds of tires were measured by the following measuring method, and when the measurement result was plotted, respectively, the graph of drawing 3 was obtained.

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equivalent to 85% of a design normal load to a drum with a diameter of 1700mm and it is forced, the rolling resistance at the time of making it run by rate 80 km/h was measured. The measurement result was evaluated with the inverse number and expressed as the characteristic to which m/M=0.9 and all the touch-down section groove surface moments make criteria (100) the inverse number of the measured value of 30% of tire (conventional tire). It means that rolling resistance is so small that this characteristic is large.

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[0017]

表1

	従　来 タイヤ	本発明 タイヤ 1	本発明 タイヤ 2
m／M	0.85	0.72	0.72
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ショルダー摩耗（指数）	１００	９９	１０５

[0018]

表2

	a	b
ＮＲ ＳＢＲ	５０ ５０	５０ ５０
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ＪＩＳ　硬度 tan δ（60℃） tan δ（０℃）	６０ 0.１１７ 0.２６３	６５ 0.０８９ 0.３００

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compared with a tire conventionally, the wet engine performance is improving remarkably. Moreover, this invention tire 2 is tan delta (60 degrees C) as cap tread rubber. Since the low high degree of hardness with high tan delta (0 degree C) carried out the rubber activity, it turns out that the wet engine performance, rolling resistance, and partial-wear-proof all are improving substantially compared with a tire conventionally.

[0020]

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CLAIMS

[Claim(s)]
[Claim 1] In the pneumatic tire which made max the touch-down length of the tire hoop direction which passes the touch-down configuration of a tread side along a touch-down width-of-face core, and was made into the configuration which becomes brief gradually, so that it goes to right-and-left both sides from said touch-down width-of-face core the ratio of the maximum touch-down length M of said tire hoop direction, and both touch-down length with the touch-down length m of a tire hoop direction [in / respectively / to the right-and-left both sides from said touch-down width-of-face core / 90% of location of the touch-down maximum half width], while setting m/M to 0.65-0.80 The pneumatic tire which made smaller than said all touch-down section groove surface moments the center-section groove surface moment of the touch-down center-section field which makes all the touch-down section groove surface moments of all touch-down fields 20 - 50%, and is equivalent to 40% of width of face of the touch-down maximum width W.

[Translation done.]